

An aerial photograph of a residential neighborhood. A road curves through the scene, separating a green area on the left from a more densely built-up area on the right. In the top left corner, a body of water is visible. The houses are mostly single-story with light-colored roofs. The text is overlaid in the center of the image.

# Childhood Asthma and Air Pollution Surveillance

Francis Boscoe, New York State Department of Health

## Purposes of the surveillance system:

- To enable rapid retrieval of specific information regarding air pollution and asthma hospitalizations:
  - What was the asthma rate in location  $x$  during time  $t$ ?
  - How many ozone exceedances were there in location  $x$  during time  $t$ ?
  - How do this year's asthma rates compare with those from 5 years ago?
- To generate hypotheses and shape research questions:
  - What is the usual lag time between high ozone concentrations and increased asthma hospitalizations?
  - Are increases in asthma hospitalizations seen for moderate levels of ozone?
- To aid in shaping intervention and prevention strategies:
  - What locations could benefit the most from a greater awareness of asthma risk?

## These questions may be answered through:

- Automatically generated reports containing summary statistics, tables, graphs and maps.
- Specific data queries generated by project staff.
- Summary information posted on a public web site.

## Limitations of the surveillance system:

- Cannot determine cause and effect relationships
  - System can only be used to guide follow-up epidemiologic investigations
- Many parts of the state will have sparse data
  - Particularly true for rare conditions such as certain birth defects
- Exposure assessment methods have limitations
  - Air pollution measures rely on interpolation methods
  - No information on indoor air quality

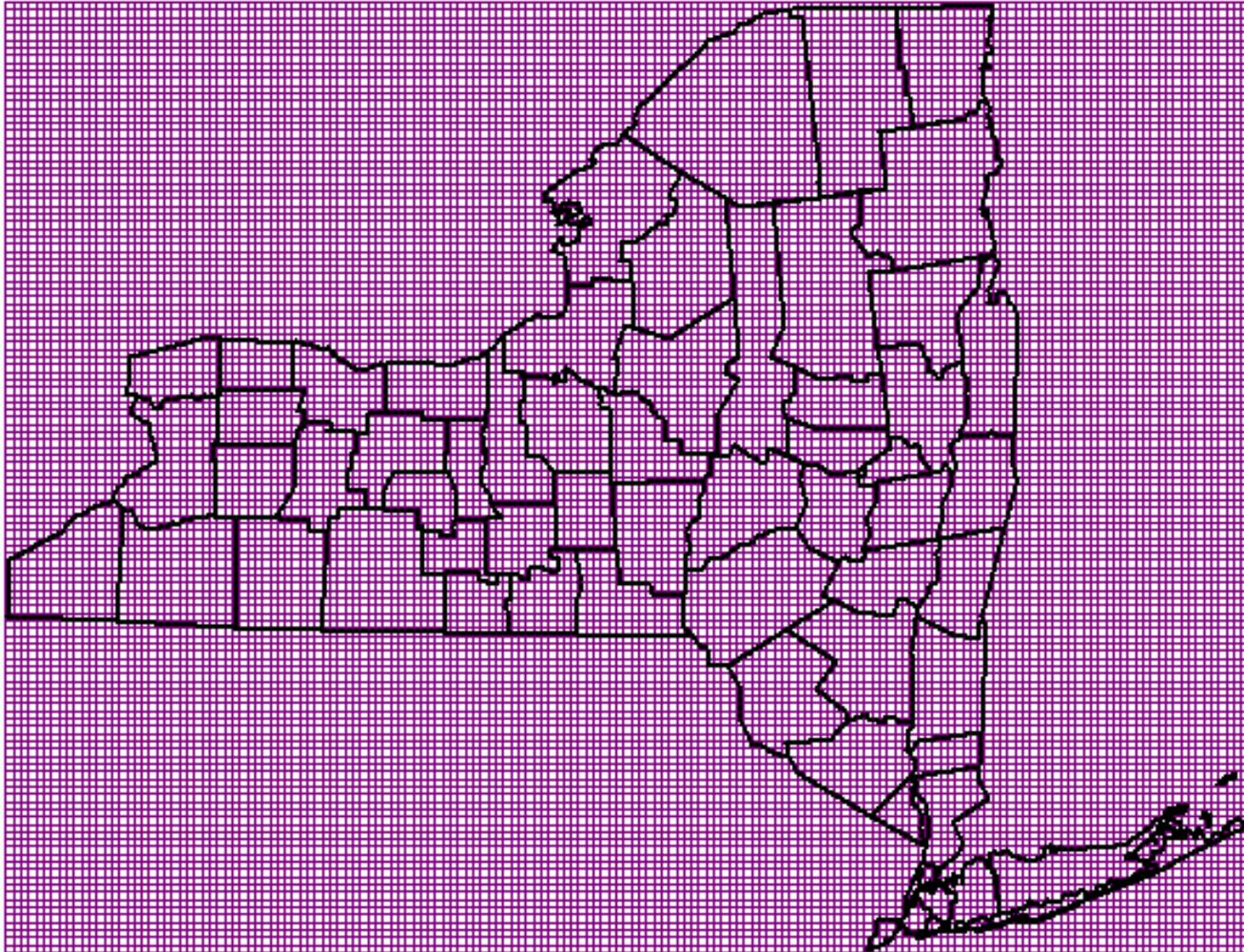
# Health Data

- ICD9 code 493.0-493.9
- Age of diagnosis 0-17 years
- Date of hospital admission

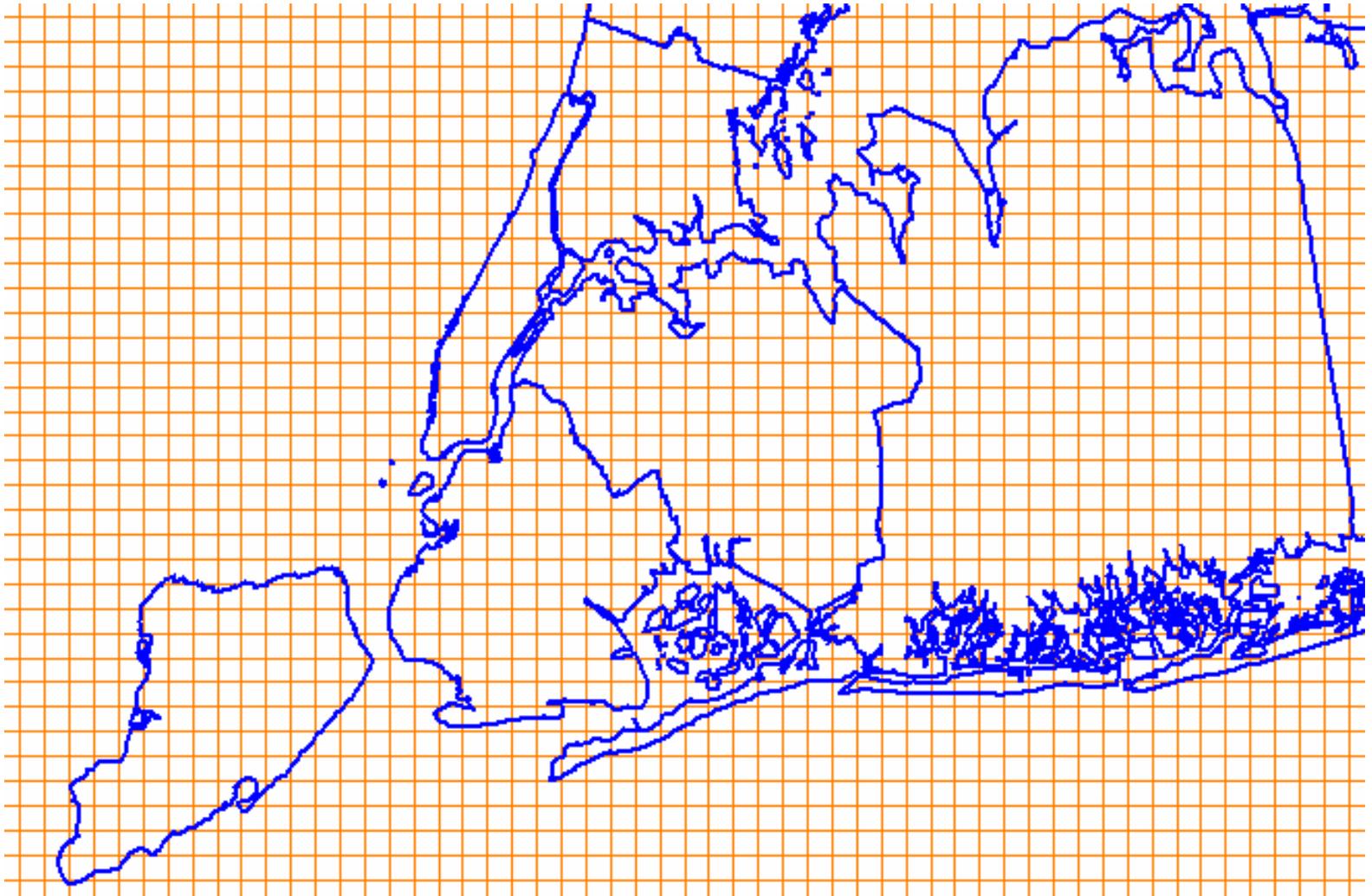
# Air pollution data

- Ozone, PM<sub>10</sub>, PM<sub>2.5</sub>, sulfur dioxide, nitrogen oxides, and carbon monoxide
- Measurements at regular time intervals (e.g. ozone measured hourly)
- Measurements at air monitors in NYS, adjacent states and Canada

# 4 km grid cells



## 1.3 km grid cells



## Data visualization examples

- The examples that follow represent proven methods that may be reasonably implemented into an automated system
- Data are derived from the public-use version of the SPARCS file, but should be treated as inexact and imprecise for the purposes of this presentation

## Data visualization examples

- Tabular reports
- Raw disease rate maps
- Smoothed disease rate maps
- Temporal graphs
- Time-comparison maps
- Interpolated air pollution maps
- Air pollution animations
- Disease cluster maps (space-time clusters, emergent clusters)
- Disease/air pollution co-occurrence maps

Revised on 07/21/2003

	NEW YORK STATE HPN DATA QUERY SYSTEM
<b>Hospital Stays due to Chronic Obstructive Pulmonary Disease</b>	
<b>RATE PROFILES</b>	

**Before Proceeding with Your Query**

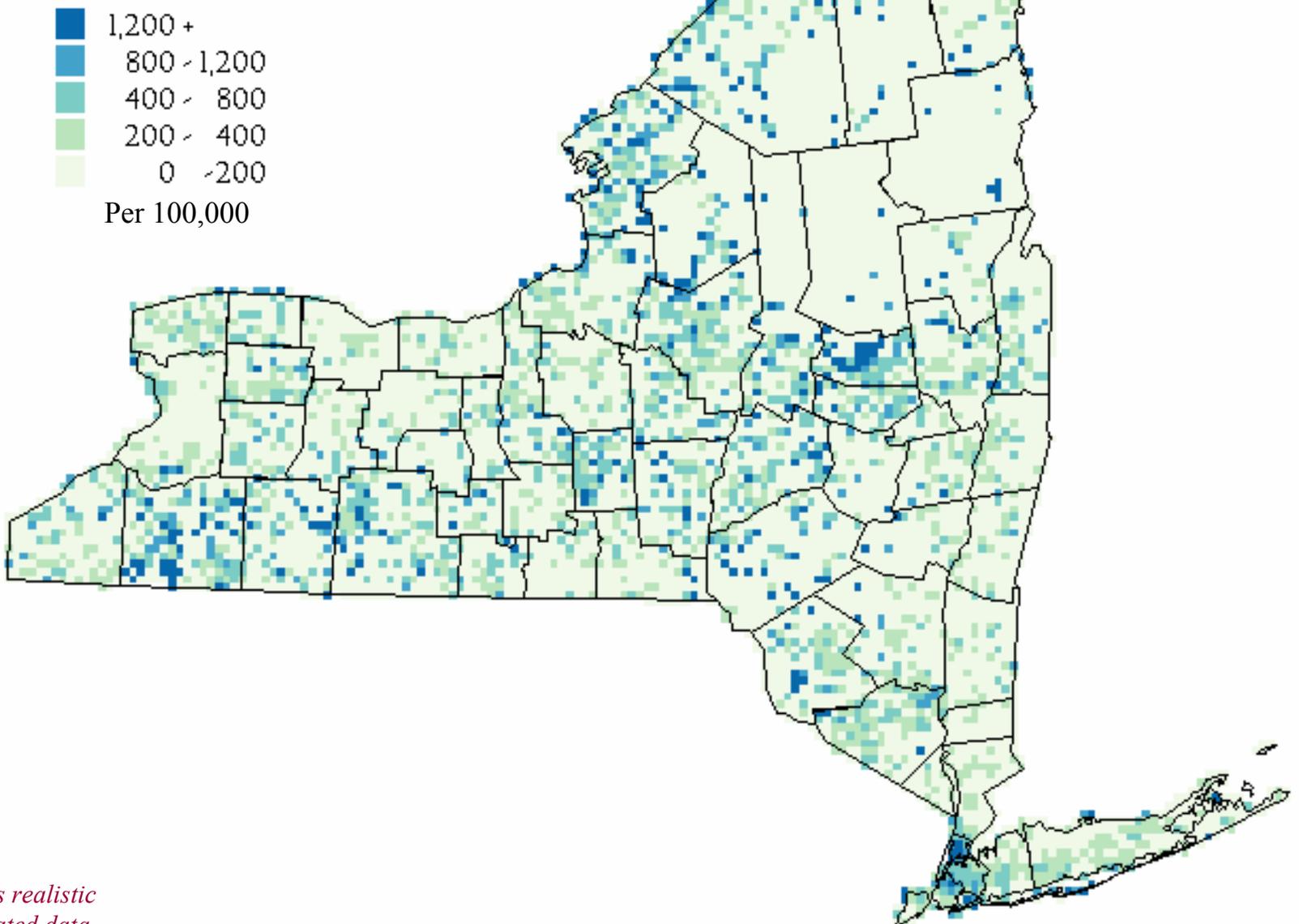
<b>Review Regulations</b>	Review <a href="#">Regulations</a> Regarding Access to <i>SPARCS Data</i> .
<b>Review Other Pertinent Information</b>	<ul style="list-style-type: none"><li>◆ Information on the <a href="#">Quality and Limitations</a> of the SPARCS data used in these queries. It is important to note that because the data is periodically updated, it <b>will</b> change.</li><li>◆ Description of the <a href="#">SPARCS Data Elements</a></li><li>◆ <a href="#">Derivation of Data Records</a></li></ul>
	These queries include discharge data for New York State residents only. The SPARCS Annual Report series is for all discharges and therefore will report slightly higher discharges in total than those reported here.

**Table 3. County Specific  
Hospitalization Counts and Hospitalization Rates  
( Per 100000 Residents For: 1996 2000 )**

*( Note: See Query Limit Table For Rate and Resident Specificity )*

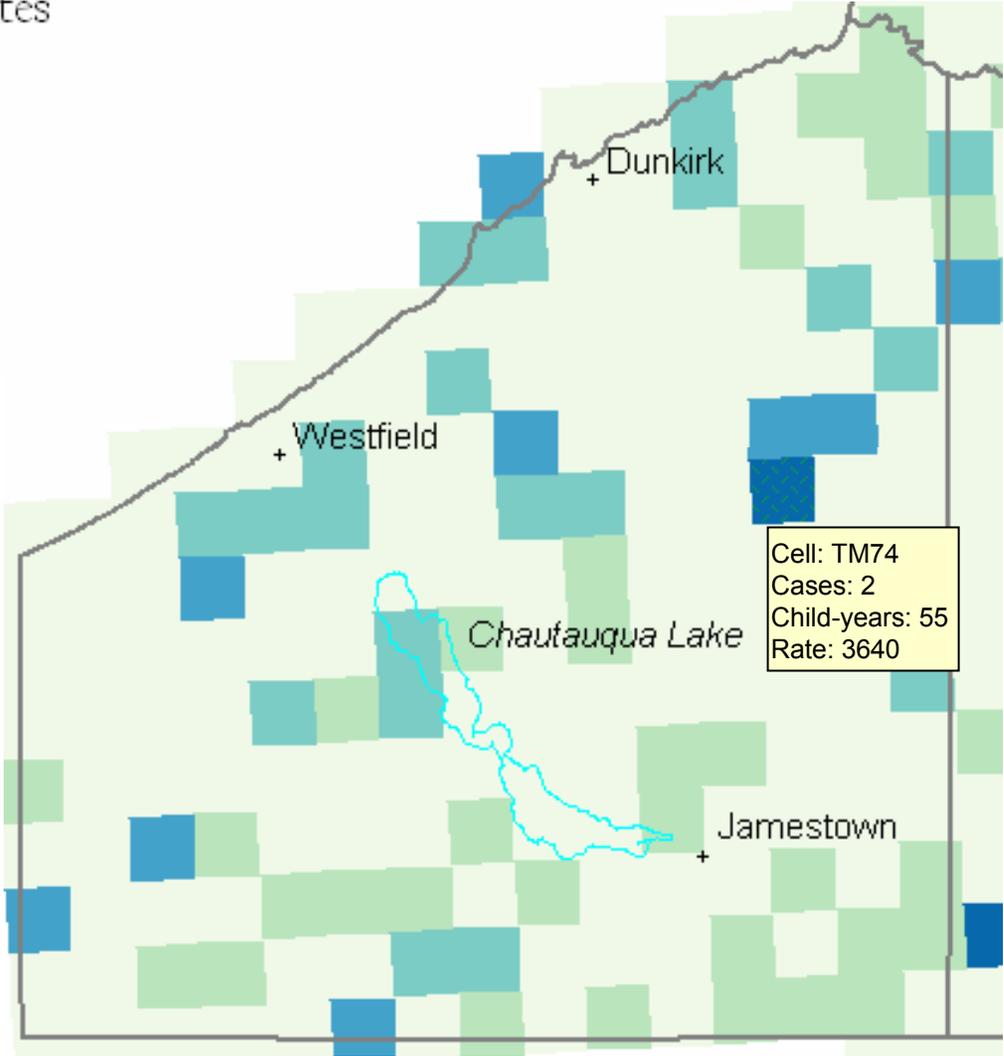
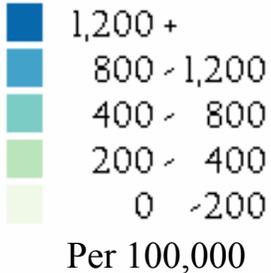
Location		1996		2000		Average		Total	
HSA	County	Rate	Counts	Rate	Counts	County or HSA Rate	Std. Deviations From State Average	County or HSA Counts	Std. Deviations From County or HSA Average
<b>HSA: 1 WESTERN NEW YORK HSA</b>	ALLEGANY	225.07	26	138.31	16	181.66	-1.28	42	-0.33
	CATTARAUGUS	362.48	74	176.88	36	269.82	-0.85	110	-0.28
	CHAUTAUQUA	177.44	56	104.84	33	141.19	-1.48	89	-0.30
	ERIE	293.35	592	178.91	362	236.06	-1.02	954	0.25
	GENESEE	268.67	39	116.20	17	192.14	-1.23	56	-0.32
	NIAGARA	273.30	136	129.77	65	201.30	-1.19	201	-0.23
	ORLEANS	175.71	19	**90.01	10	132.28	-1.52	29	-0.34
	WYOMING	116.22	12	**38.11	4	76.84	-1.79	16	-0.34

# Childhood Asthma Hospitalization Rates 1996-2000



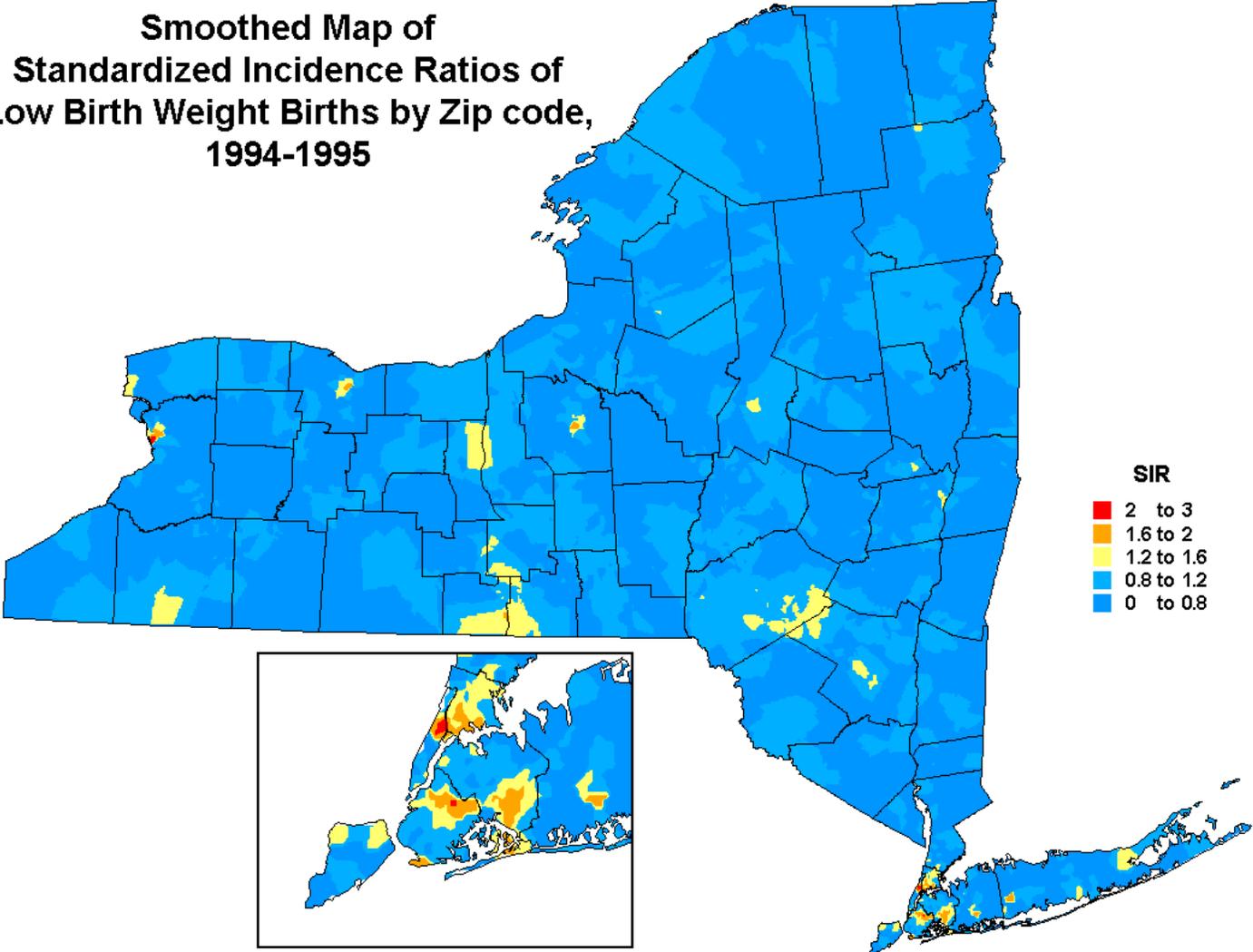
*This map uses realistic  
though simulated data.*

# Childhood Asthma Hospitalization Rates 1996-2000



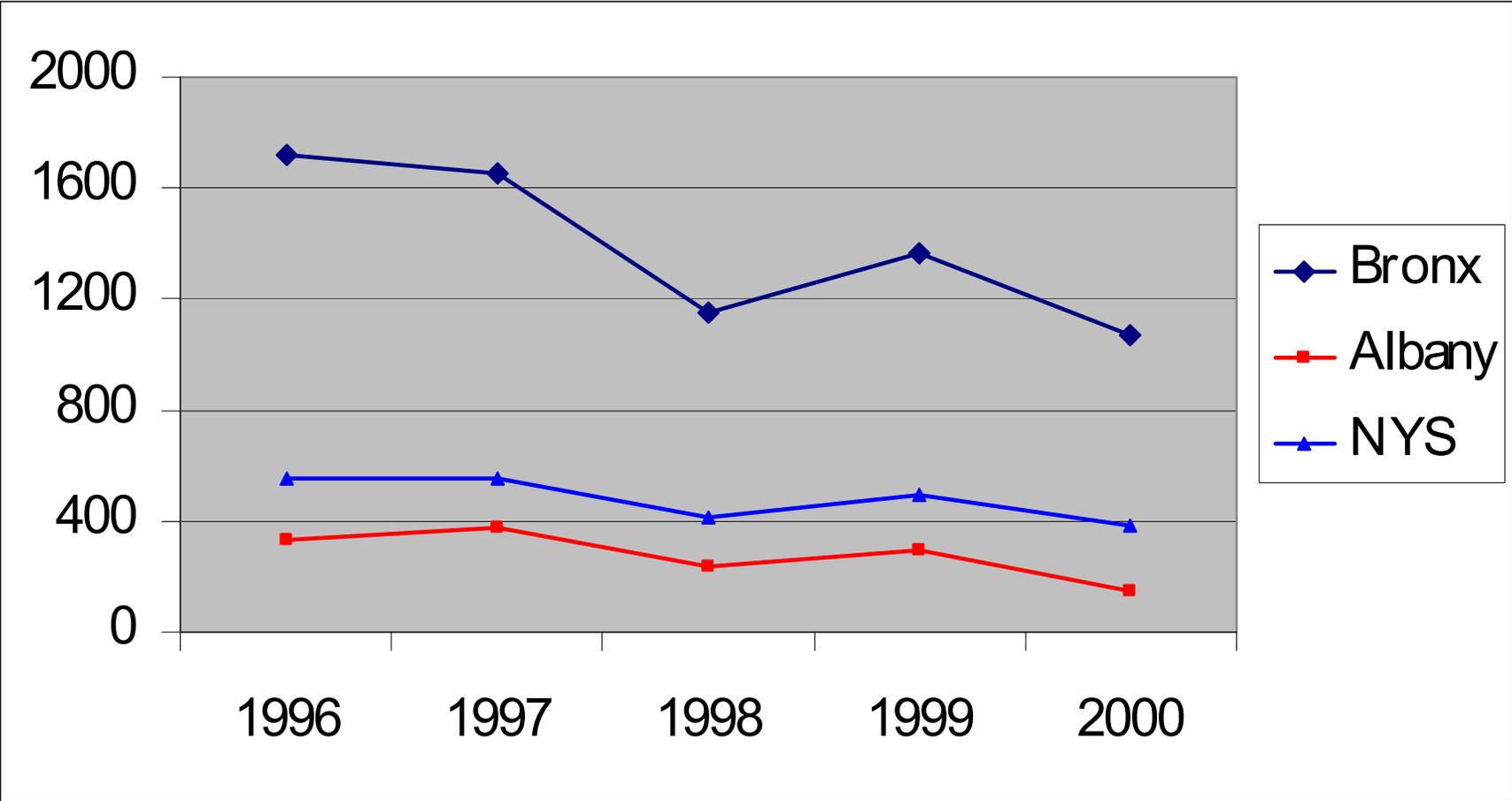
*This map uses realistic though simulated data.*

# Smoothed Map of Standardized Incidence Ratios of Low Birth Weight Births by Zip code, 1994-1995



Based on grid points capturing a minimum of 250 births

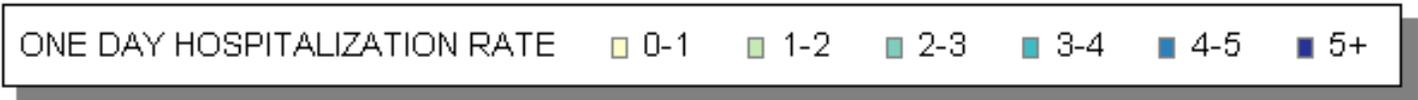
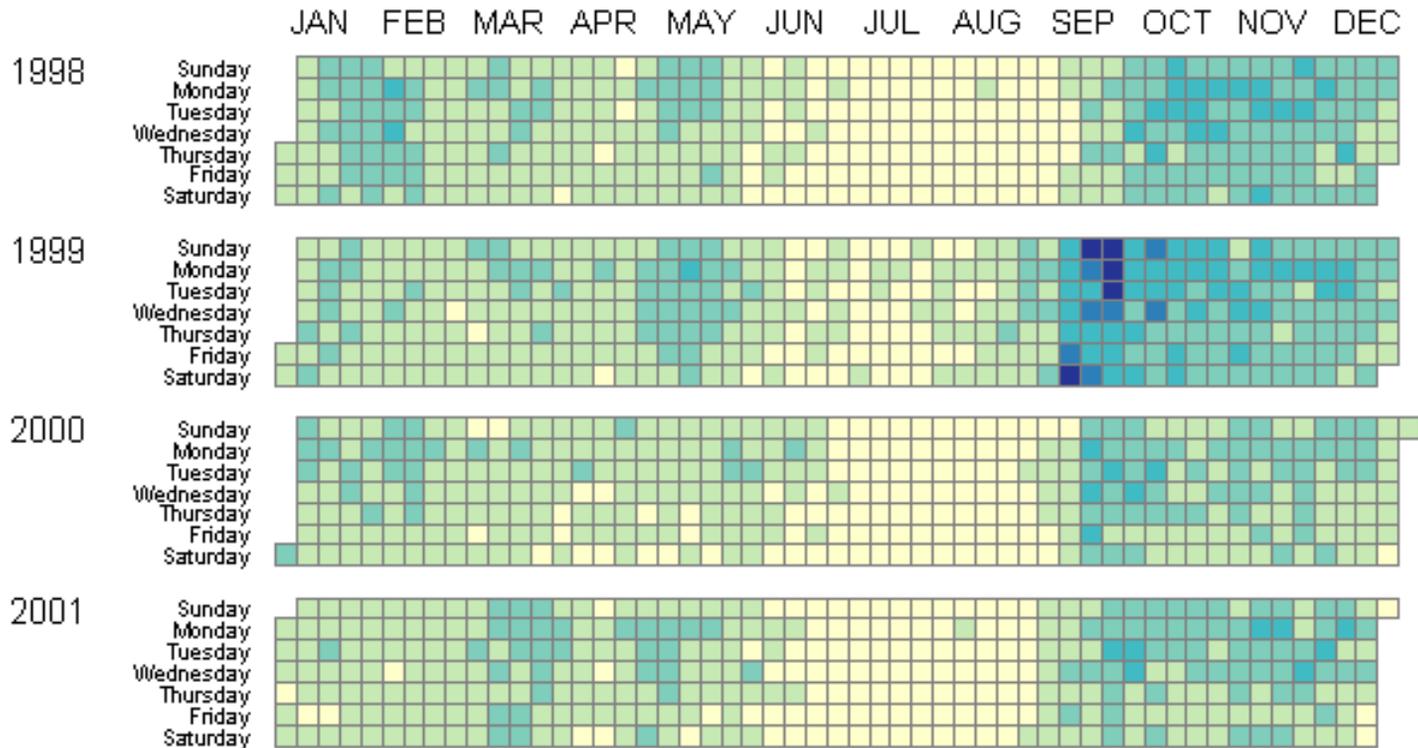
# Temporal Trends in Childhood Asthma Rates



Rate per 100,000 children

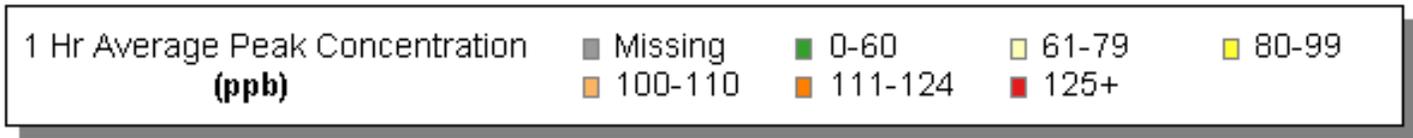
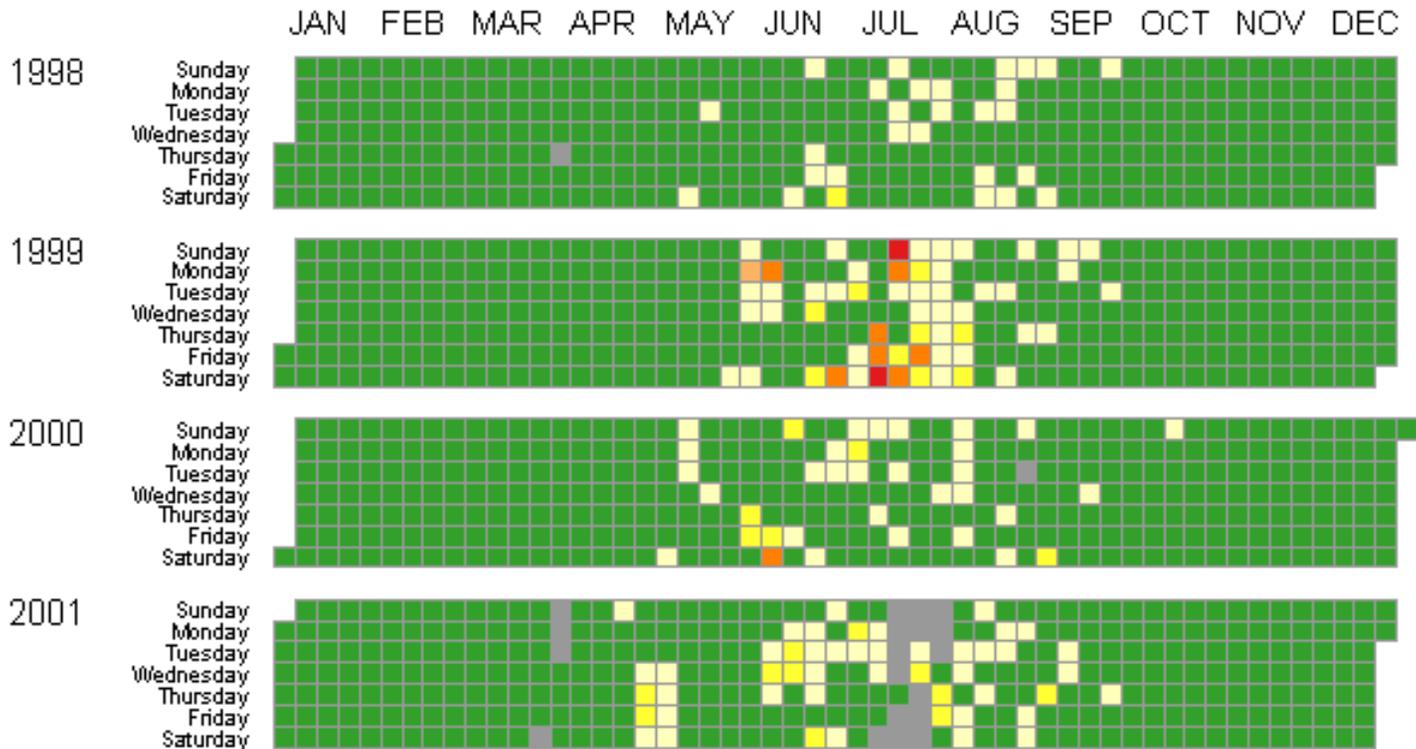
# New York City Asthma Hospitalization Rate

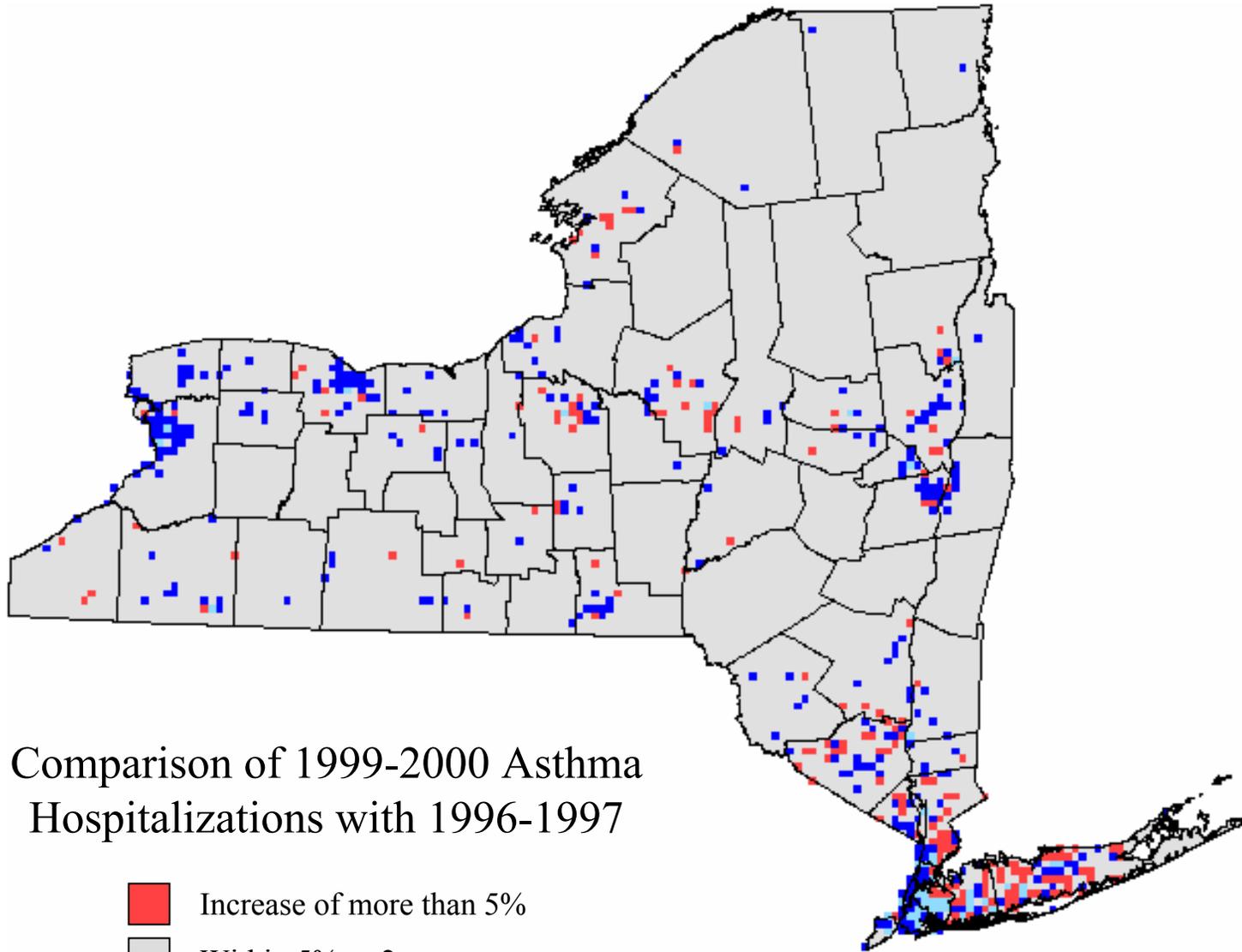
(Under 18 Years of Age) Per 100,000 Population



# New York City Ozone

Daily 8 Hr Maximum Ozone Concentration (ppb)

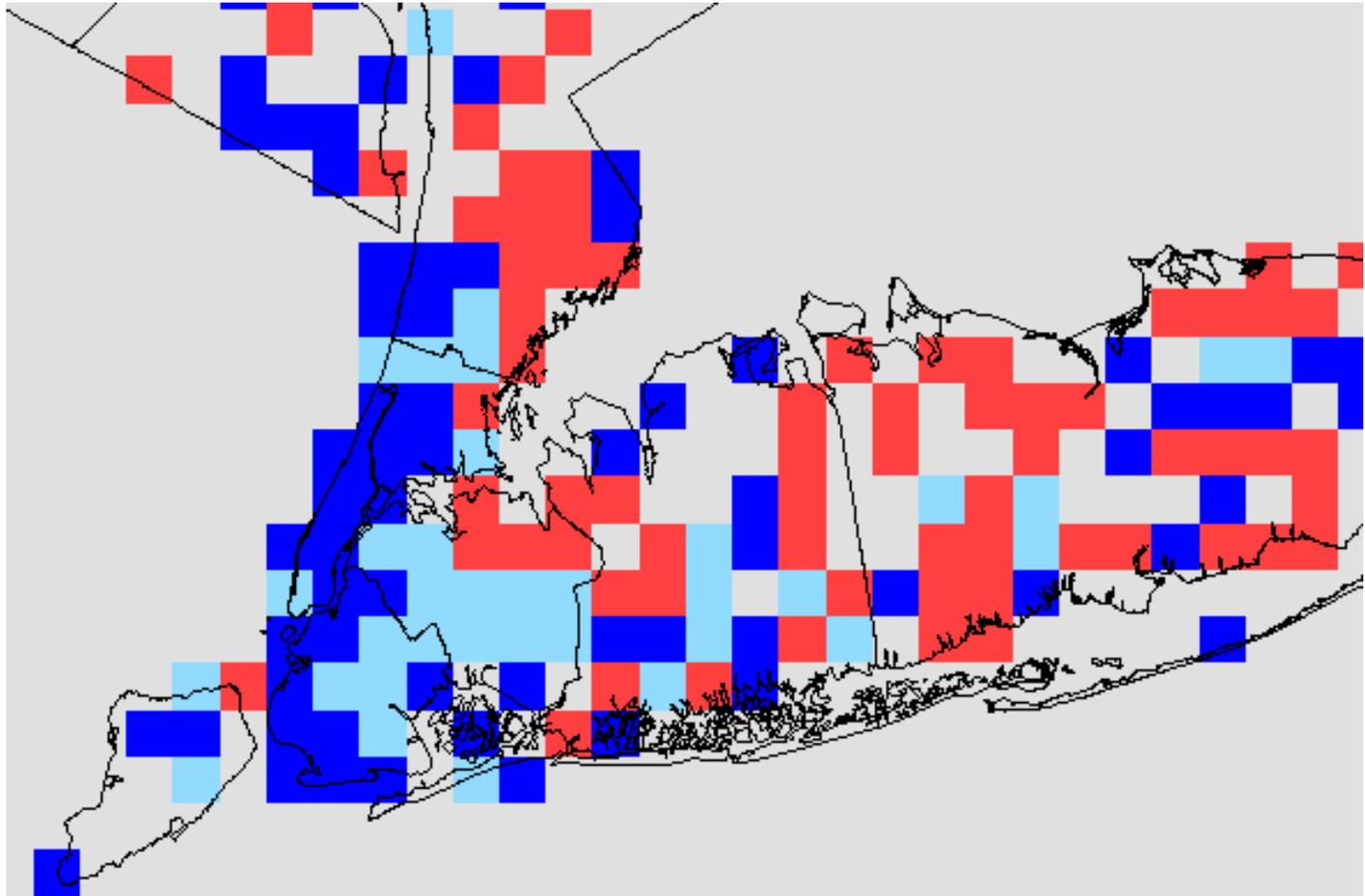




### Comparison of 1999-2000 Asthma Hospitalizations with 1996-1997

- Increase of more than 5%
- Within 5% or 2 cases
- Decrease between 5% and 22%
- Decrease of more than 22%

Statewide average decrease 22%



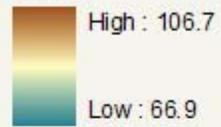
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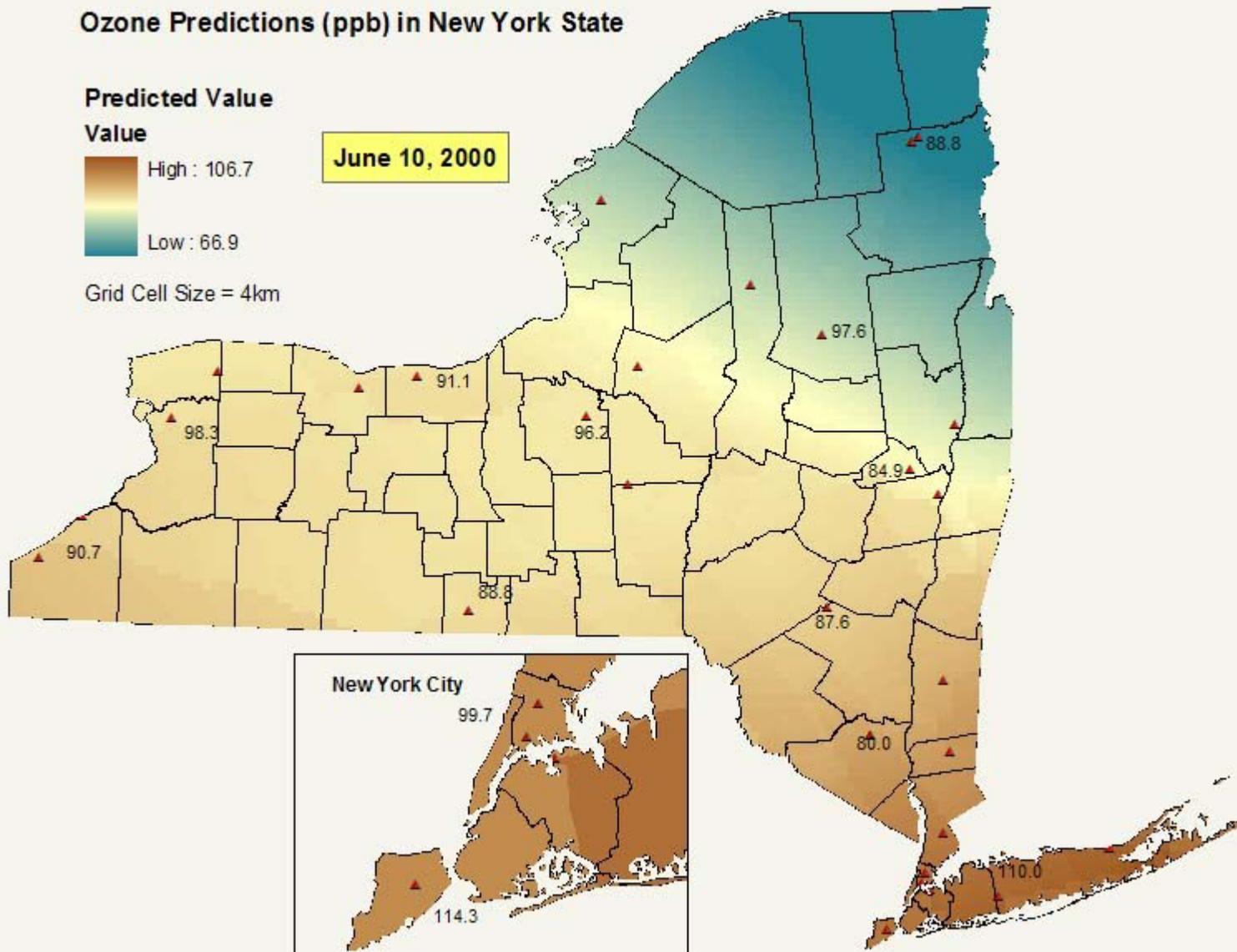
# Ozone Predictions (ppb) in New York State

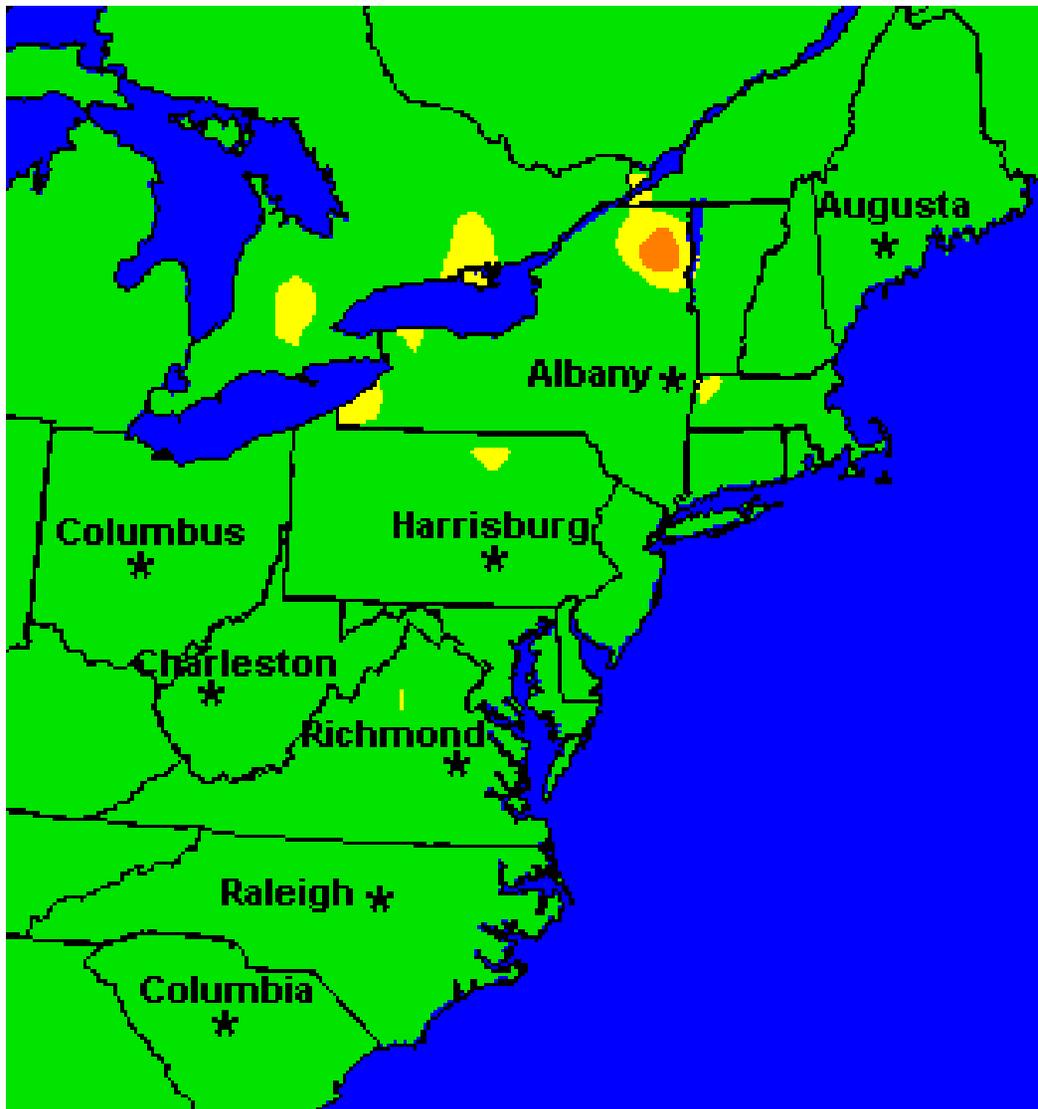
Predicted Value  
Value



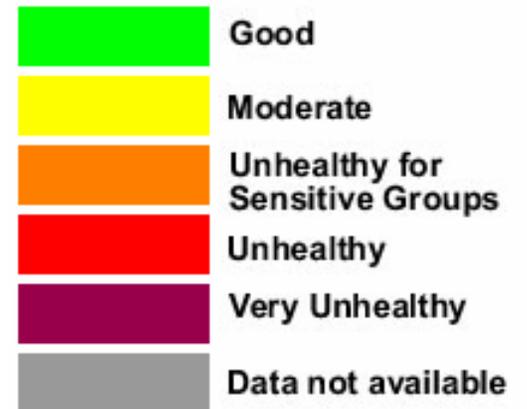
June 10, 2000

Grid Cell Size = 4km





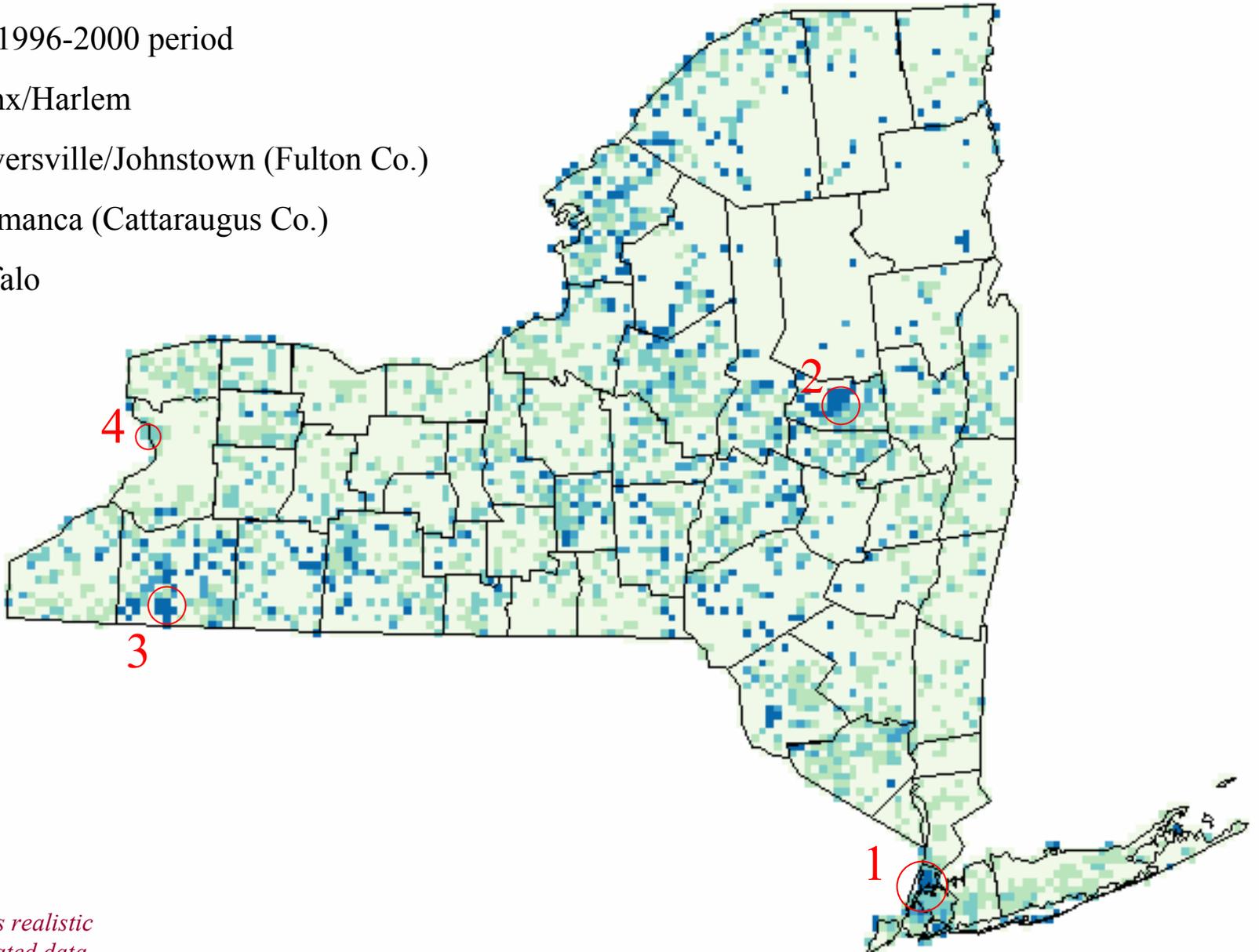
### AQI Loop - Ozone



July 4, 2003 8:00 am EDT

Areas of elevated incidence  
for entire 1996-2000 period

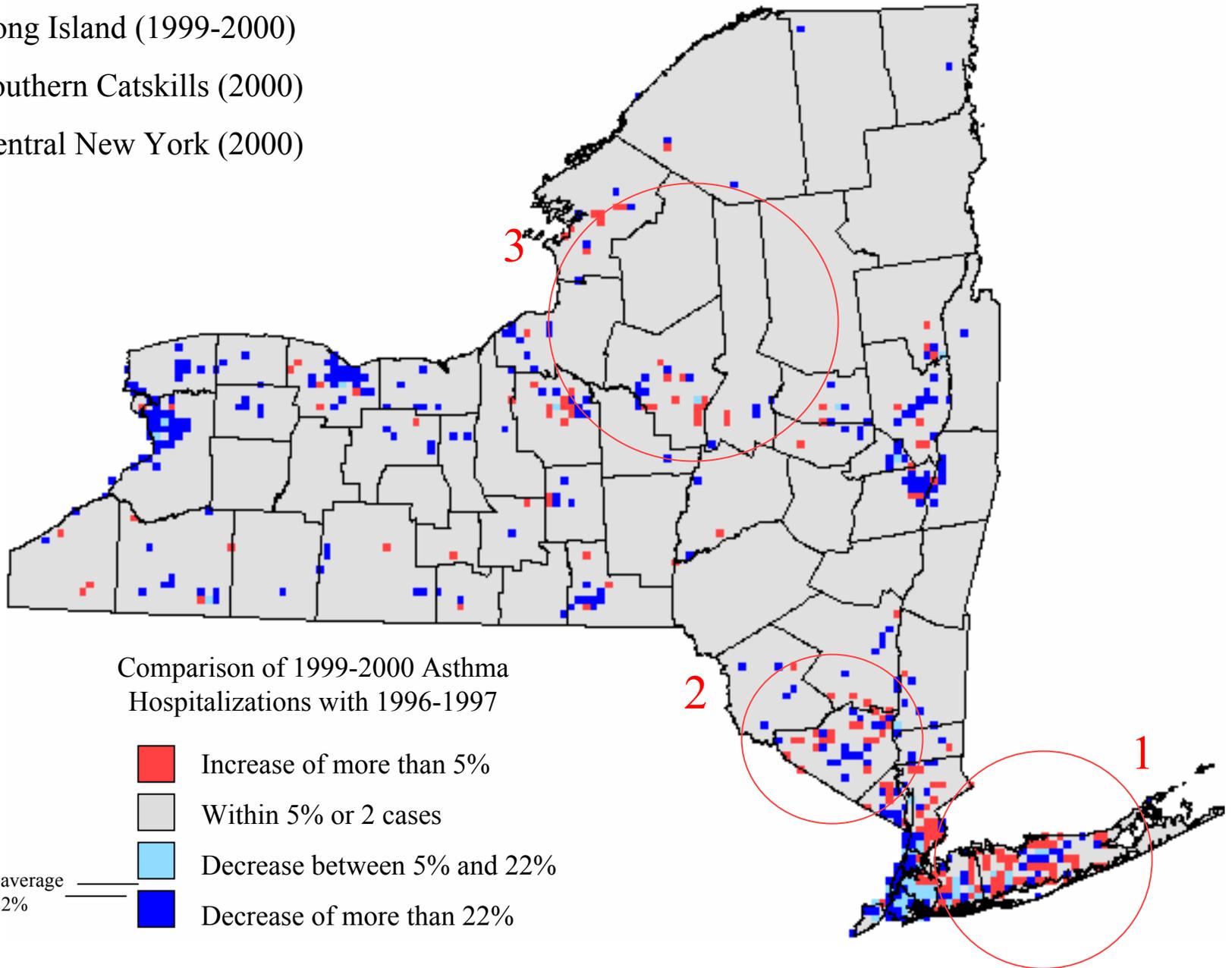
1. Bronx/Harlem
2. Gloversville/Johnstown (Fulton Co.)
3. Salamanca (Cattaraugus Co.)
4. Buffalo



*This map uses realistic  
though simulated data.*

## Emergent clusters

1. Long Island (1999-2000)
2. Southern Catskills (2000)
3. Central New York (2000)



# Asthma Rate Per 100,000 Population (age 0-14 Years)

Vs

## Peak 8 Hours Ozone Levels (ppm)

